



**BULLETIN**  
OF THE  
**BRITISH ORNITHOLOGISTS' CLUB**

---

**Volume 83**

**Number 3**

*Published: 1st March, 1963*

---

The six hundred and fifth meeting of the Club was held at the Rembrandt Hotel, London, on 19th February, 1963.

*Chairman:* MAJOR-GENERAL C. B. WAINWRIGHT

Members present: 24; guests 9; total 33.

Dr. J. G. Harrison exhibited and commented upon a Curlew which had a congenital deformity of the maxilla.

This bird will be illustrated and described in the *Bulletin*.

Mr. W. E. Eales, Warden of the Blakeney Point Reserve, Norfolk, showed a film of some of the birds of that area, sequences of Brent geese and the terns being particularly good. He also showed a film of the Borough Fen decoy.

**Mottled plumage in the genus *Corvus*, its causation and relationship to fundamental barring**

*by* C. J. O. HARRISON

*Received 15th September, 1962*

INTRODUCTION

While examining skins in the collection of the British Museum (Natural History) for evidence of melanic schizochroism I had occasion to study the skins of young Rooks, *Corvus frugilegus*, showing abnormally light markings on the feathers. These birds had formed part of the data for a

series of papers by J. M. Harrison (1949, 1950, 1957a, b) and Sage (1956a, b, c, 1957a, b, 1958) describing such mottled plumages in the Rook, *C. frugilegus*, Carrion Crow, *C. corone*, and Jackdaw, *C. monedula*. It was suggested in these papers that the markings were of genetic origin and evidence of a reversion to an ancestral mottled pattern in the Corvidae. I considered that the evidence shown by these skins was not wholly in accord with these conclusions and re-examined them accordingly.

#### DESCRIPTION OF SPECIMENS

The skin of a juvenile, *C. frugilegus* from Waith, Lincolnshire (a), collected

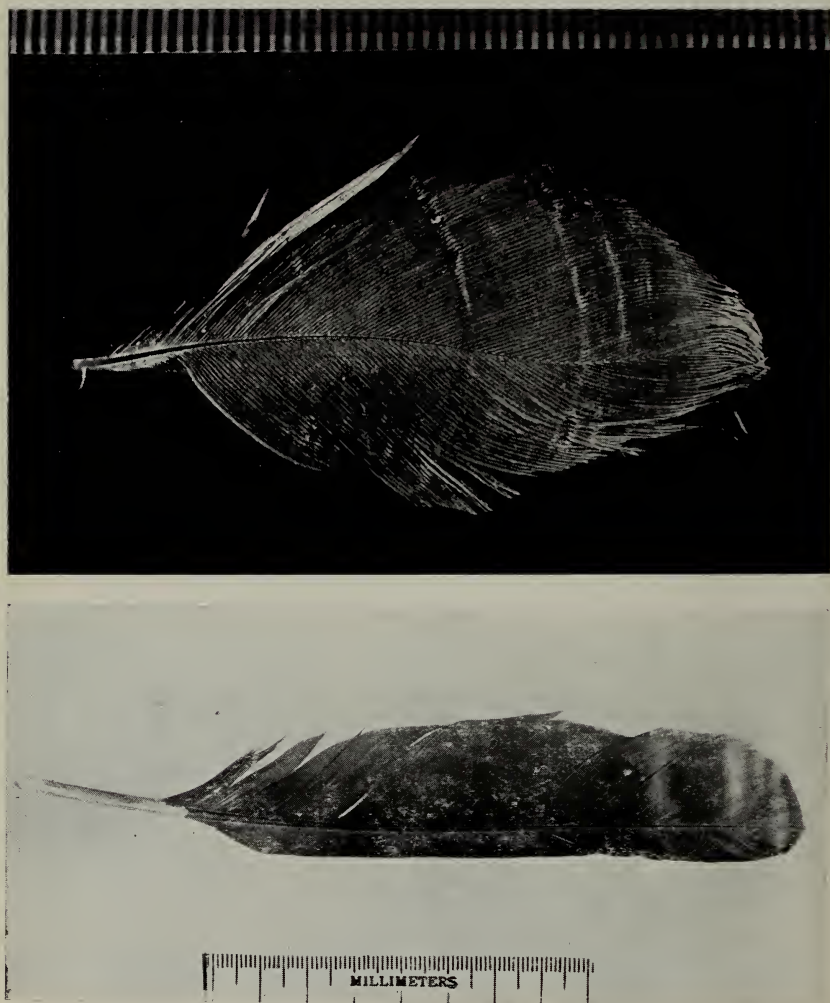


FIG. 1. Feathers from specimen (A). Enlarged covert showing "hunger-traces" and primary showing white bars

in May 1902 (B. M. No. 1938. 3. 19. 112) was considered to show important evidence. This had the remiges and rectrices partly in quill. The contour feathers were greyish in colour on the rachis and towards the tips, and of a loose fluffy texture. The feathers of the wings and tail were almost normal, but marked with a few narrow transverse greyish bars which became almost white on the innermost web of the inner primaries. Most of these inner primaries showed clearly three pale subterminal bars, close together, and most conspicuous on the inner web, less easy to see on the outer web where they appeared obscured by iridescence. About a centimeter nearer the proximal end of the feather was another pale bar. These bars were less well marked on the coverts and one of the greater coverts of the scapular region showed no pale bars but significantly revealed a series of "hunger-traces" (also referred to as fret-marks, or fault-marks) occupying the same relative position on the feather as did the pale bars on the primaries (Fig. 1). On this same feather there was another "hunger-trace" nearer the base of the feather. This was not apparent as a pale bar on the remiges but did appear as a modified "hunger-trace". The bars were less apparent on the outer primaries and the lesser coverts. They were absent from the tail, but the corresponding "hunger-traces," although slight, could be seen on some feathers. Some of the feathers which grow later, the axillaries and under wing-coverts, were quite normal in appearance.

Another specimen of the same species from Grainsby, Lincolnshire (b), May, 1920 (B. M. No. 1938. 3. 19. 115) showed a single whitish transverse bar on most feathers. The secondary feathers showed a number of "hunger-traces" as well. On most of the wing feathers this pale bar was about  $\frac{1}{2}$  mm. below the tip of the feather. In this specimen the tail feathers, which were only half out of quill, appeared normal, as did feathers on the under side of the wing, the axillaries, the lesser coverts, and the lower mantle. Other contour feathers were of a loose fluffy texture like those of the first bird, and also showed a single transverse white bar. Another specimen (c), also from Grainsby, June 1923 (B. M. No. 1938. 3. 19. 114) was very like the previous bird. The contour feathers were, however, whiter and gave the body a greyish appearance. Most of the feathers of wings and back showed a whitish subterminal bar with a fainter bar nearer the tip, this double bar being visible only on the larger feathers. The inner webs of the innermost primaries showed in addition a series of three well spaced bars, about a centimeter apart, along the length of the feather. These bars became progressively less apparent on the outer primaries. Many feathers showed series of "hunger-traces", although these did not necessarily coincide with these whitish bars. There was again evidence of later normal feathering. There was also a wing of another individual (d) from Ashwell, Baldock, Herts, May, 1946 (B. M. No. 1946. 35. 1). This showed a single whitish bar which was almost terminal on the primaries and on the secondaries, from some of which it had worn away. It was more subterminal on the coverts, and the lesser coverts were normal, as were the axillaries and the under wing-coverts.

A mounted specimen of the Raven, *C. corax*, in the Museum collection had completely abnormal plumage, being a dilute partial-albino. The feathers of the lower belly, forehead, and throat were loose and fluffy in appearance. The pigmented portions of the plumage were greyish-brown,



the feathers being well pigmented at the tips and becoming progressively paler. The innermost secondaries showed a transverse pale bar across the middle of each feather with a well marked "hunger-trace" on the distal edge of it.

In addition to the above birds Dr. J. M. Harrison kindly loaned me specimens from his collection showing barred plumage. These consisted of six specimens of *C. frugilegus* all from Ashwell, Hertfordshire, and a specimen of *C. corone* from Sevenoaks, Kent. All appeared to be young birds. The first (e), collected 13th May, 1950 had only wings and tail preserved. These showed a much more normal plumage than that of the birds already described, and the feathers had a marked iridescent gloss. There was a brown bar, partly masked by iridescence, across the secondaries, about 30 mm. below the tip, and a less obvious bar in a similar position on the primaries. There was also a similar bar on the greater and median coverts but the lesser coverts appeared normal. On the rectrices the bar was present but faint. A single wing of another specimen showed a pale bar midway along the secondaries, but this became very faint on the primaries and coverts. The wings and tail of a third individual (f) taken in May 1950 showed a prominent whitish bar on the remiges, becoming faint towards the outermost primaries, and similar bars on the coverts. The position of the bar in this case was relatively near the base of the feather. The tail showed a pale bar midway on the partly grown feathers. A skin (g) taken 7th May, 1949 showed a condition similar to that of the museum specimens, with loose-textured contour feathering, and almost all the feathers marked with a white terminal bar except the rectrices which were only half-grown. Another skin (h) taken 12th May 1950 had the same loose-textured contour feathers but with more normal feathers appearing at the lower edge of the mantle. Most of the feathers showed a white bar similarly placed to that of (e), the bar on the rectrices being more distally placed to that of the remiges, the former being later in growth. A final specimen of this species taken 5th May, 1950, had black contour feathers marked with a brown sub terminal bar. On the remiges, rectrices, and greater coverts this bar was not apparent but its position was indicated by a faint "hunger-trace" that was little more than a change in the thickness of the feather structure. On the rectrices its position was almost terminal.

The specimen of *C. corone* taken 30th Dec., 1959 has normal contour feathers but almost all the feathers of wings and tail were brownish and showed some loss of iridescence. The rectrices showed a series of three "hunger-traces" towards the tips, in the same position on each feather, and all had whitish bases. The remiges showed a broad whitish bar towards the base of the feather, more marked on the inner web. On some feathers the bar had a well marked "hunger-trace" on the distal edge of it which in places had caused some of the barbs to break off short. Presumably as a result of the rate of growth the bars appeared in a slightly different position on each primary, producing an arc of pale markings across the feathers. From the coincidence of position in "hunger-traces" on different feathers in wings and tail, indicating a simultaneous growth of such feathers, I was of the opinion that this was a young bird.

#### CAUSATION OF MARKINGS

There are two points to be noted concerning the variant plumages described above. One is the apparently random position of the pale bars in

relation to the feather (Fig. 2), the other is the apparent relationship between such bars and "hunger-traces". The causation of "hunger-traces" is well-known and has been recognised by bird-keepers, particularly falconers who were dependent on the condition of the bird's plumage, for a very long period. It was known that even a short period of starvation, during the time when feather growth was taking place, would result in a narrow transverse zone of malformed or weak structure on the feather, and that such a feather was liable to break off along this line of weakness. Riddle (1908) made a careful study of "hunger-traces", or "fault-bars" as

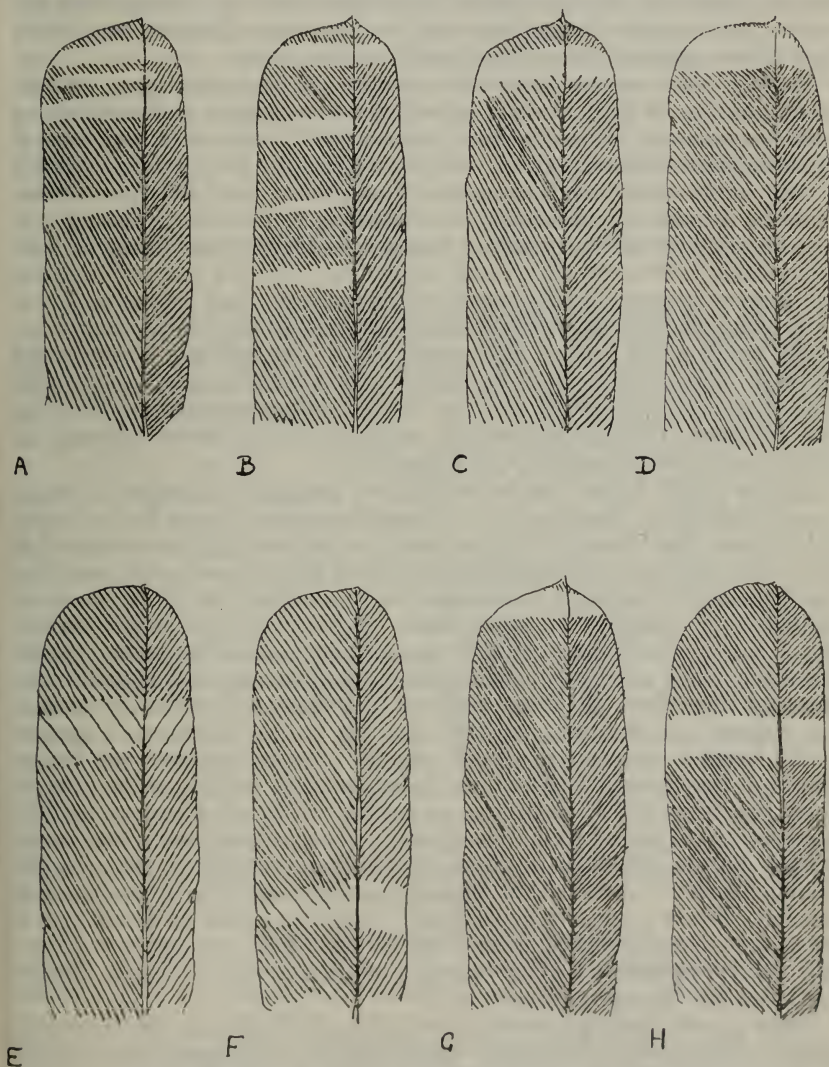


FIG. 2. Sketches of single inner primaries from specimens of *C. frugilegus* to show variation in position of bars



he called them. He found that they could be produced experimentally by reducing food, by feeding chemicals which affected nutrition or reduced blood pressure and hence the blood supply to the feather, or by mechanical damage to the feather germ; and considered them normally produced by poorer nutritive conditions. He also found that a temporary loss of melanin pigment was often associated with the traces, that a zone of unpigmented structure might occur on the proximal side of a well-marked trace, and that the factors producing these traces might, in some circumstances, produce unpigmented zones on feathers instead. This agrees with the evidence from the skins which have been examined, where "hunger-traces" are replaced by unpigmented bars on some feathers, and where traces show adjacent proximal pale bars in some cases.

There is also evidence from other sources. D. Goodwin (pers. comm.) bred a number of Jays, *Garrulus glandarius*, in captivity, and some young were hand-reared. With the earlier broods difficulty was experienced in providing natural food, and the first plumage of the young birds exhibited barring of this type. On one occasion a young bird which had begun to show evidence of transverse barring on the growing feathers was placed in the nest of wild Jays while its sibling was hand-reared. It was found that the bird placed in the nest, which presumably was receiving natural food, did not show barring on those portions of the feathers which grew subsequent to its being placed there, while the hand-reared bird showed barring on the entire length of the feather. Such captive birds moulted into normal adult plumage with no evidence of barring. Yarrell (1843) recorded an example of *C. frugilegus* with barred plumage which moulted into normal plumage, and Mayaud (1950) described two specimens with barred plumage in which normal adult feathers were appearing.

Rollins (1959) found that by offering an unnatural or deficient diet to young Blackbirds, *Turdus merula*, he could produce a grey bar on black tail feathers. He found that by persisting in such feeding he succeeded in producing feathers with normally pigmented tips but with grey proximal portions. Such feathering is well-known to aviculturists, being prone to appear in the plumage of young birds, particularly those whose normal insect diet it is difficult to supply in adequate quantities under captive conditions. It is usually lost during the moult into adult plumage but may reappear there if the diet is still deficient. It is likely to be most apparent in the remiges and rectrices, possibly because in such feathers a greater length tends to be exposed, while only the terminal portion may be apparent in the contour feathers, the paler proximal portion being hidden. J. M. Harrison (1957b) illustrates an example of this in *C. corone* and *C. monedula*, both young birds. The former species seems particularly prone to such defects, especially in urban or suburban areas where the principle feeding places are often rubbish tips, and the diet is likely to be abnormal or deficient. Where normal melanisation is reduced to such an extent that it only occurs towards the tip of each feather the whole plumage may have a pale spotted appearance. The plumage of the aberrant *C. corax* already described has this appearance.

There appears to be good evidence that a period of insufficient nutrition, similar to that which gives rise to "hunger-traces" in feathers, may result in an absence of melanin pigments in the portion of any feather grown during that period. If the time of reduced nutrition is sufficiently short the portion

of the feather lacking melanin may appear as a pale transverse bar on the feather. Riddle (*op. cit.*) was able to calculate the rate of growth of feathers in some species. He found that the primaries of fowls and pigeons grew at the rate of 4–6 mm. daily. The three pale bars *c.* 3–4 mm. wide separated by dark bars *c.*  $1\frac{1}{2}$  mm. width at the distal end of the primaries of the first specimen of *C. frugilegus* suggest that this bird may have suffered three consecutive days of inadequate diet, with a short period of adequate nourishment each day.

Since the absence of melanisation apparent in the light transverse bars is not accompanied by abnormal feather structure as in the "hunger-trace" it seems likely that it represents a period of unbalanced nutrition, rather than of complete absence of food. If we consider the position of pale bars on the feathers, the tendency for such markings to occur at the tip is most noticeable. This suggests that the periods of insufficient nutrition most frequently occur when the growth of the feathers has just begun. Since these are young birds most of the feathers will be growing simultaneously, and this is likely to throw a great strain on the metabolism of the bird. It is a period at which it is most likely that the internal resources available may temporarily fall below a threshold at which normal melanisation can occur.

If these bars are due to nutritional deficiencies occurring at a particular period in feather growth, then patterns which show similar markings on the feathers over a large part of the body are only likely to occur in young birds where most of the feathers will be growing simultaneously. In older birds, if such markings occur, one would expect them to be distributed irregularly over the various feathers indicating the stage of moult at which the deficiency occurred. This would appear to be true in the case of the adult *C. monedula* described by Sage (1957b). Bolam (1912) mentions retention of barred plumage in an adult *C. frugilegus* but does not record if it maintained any symmetry. The remiges, rectrices, and most of the wing-coverts are not moulted in the first autumn but are retained, so that a young bird would show evidence of its earlier plumage in the wings and tail until the following summer. The example of *C. corone* described by Sage (1956a) and of which he received only the wing, could therefore still have been in juvenile plumage, and the same applies to the young birds seen by J. M. Harrison (1957a) in Kent, in winter. The only apparent evidence to the contrary is the description and illustration, in the early nineteenth century, by P. A. Millet, of a single French specimen of *C. frugilegus* which has extensive greyish-white tips to the feathers of wings and tail, but which shows white skin at the base of the bill (J. M. Harrison, 1950). Since this bare skin appears during the first winter and summer, while the flight feathers may be retained until the end of the first summer it is possible that this also was a young bird.

#### MOTTLED PLUMAGE AND REVERSION

Both Sage and J. M. Harrison, in the papers to which reference has been made, appear to assume that this abnormal plumage is genetic in origin and recessive in character, and that it may represent an "ancestral" plumage of the Corvidae. There does not appear to be any good evidence for this. The phenomenon is one which mainly affects juvenile plumage, and can be shown experimentally to be due to defective nutrition. The patterns



created by it are variable, and appear to be due to factors affecting pigmentation of the whole plumage at one particular period in time. There is no evidence that it is passed from one bird to another. Where such plumages occur in captive birds they are lost in subsequent moults. The fact that such plumage peculiarities occur repeatedly in different years at the same rookery does not necessarily indicate that a hereditary factor is present. They could be due to factors present in the food and feeding areas available in the locality, or to individual birds. The individual bird which consistently fails to rear or feed its young properly, year after year, is known to aviculturists. The widespread occurrence of these abnormal plumages in small numbers (Sage, 1958.) does not need any genetic explanation if it is merely an aspect of nutrition. J. M. Harrison (1957b) has suggested that such plumage aberrations are due to inbreeding in a population which has increased considerably in the absence of predation or control. Such factors could, however, equally result in the diminution or impoverishment of food supplies, with a need to utilise the less natural types of food made available by man. Lack of predation would also enable poorly nourished individuals with defective plumage to survive.

Some of the individuals referred to by Sage (1957a, 1956b) as "mottled" appear from the description to be probably either dilute (chlorochroic) or non-phaeomelanic schizochroic individuals.

#### MOTTLED PLUMAGE AND FUNDAMENTAL BARRING

While these abnormal plumages are not a reversion to an ancestral plumage pattern of the Corvidae they are of interest in their relationship to "fundamental barring" and the derivation of plumage pattern in general. Fundamental barring is the name given to the pattern of narrow transverse dark and light bars that is apparent on some of the feathers of many individuals in a great number of species where such barring is not a characteristic part of the plumage pattern. Such barring appears to be peculiar to feathers containing melanins, including those where such melanins are concealed by structural colours or iridescence. The widespread occurrence of such barring was recognised by Whitman (1907) and Riddle (*op. cit.*). It was commented on by Lowe with regard to British (1941) and Asiatic birds (1942) and examined more fully by Glegg (1944) under the name of "latent" or "subordinate" barring, although neither appeared to be aware of earlier work on the subject. Glegg examined four specimens each (adult and juvenile, males and females) of as many species on the British List as he was able with a view to discovering how widespread this character was. In all he examined 935 skins and found evidence of fundamental barring on some part of the plumage of every one. He also noted the association between such barring and the presence of melanin pigments, but drew no conclusions from it.

Riddle (*op. cit.*) found that by reducing blood pressure in birds he could produce "hunger-traces" or whitish areas on a feather. He found that there was a daily rhythm of blood-pressure fluctuation, with low pressure from 01.00–05.00 hrs. He also found that each pair of light and dark fundamental bars appeared to constitute a day's growth for the feather, and he deduced that this fundamental barred pattern represented a daily rhythm of melanin deposition, with reduced melanisation in the early hours of the morning resulting in the presence of a paler bar, narrower than the adjacent dark one. The light bars on the plumage of corvids offer additional



confirmation of the idea that a temporary reduction of melanin will produce a barred pattern comparable to that found as a fixed pattern in the plumage of other birds.

There is additional evidence for the apparently inadvertent production of alternate layers, which differ in pigmentation and composition due to a daily rhythm, in the physical functioning of the body of the bird. This occurs during the deposition of yolk within the follicles of the ovary of the female. If the feeding of foods containing fats and carotenes to domestic poultry is limited to a short period of the day, or if the diet is deficient in these, then a stratum of so-called white yolk, lacking both pigments and fats, is laid down during the early hours of the morning, and the resultant egg-yolk shows a series of concentric layers of white and yellow yolk indicating the period of formation. Since the period when white yolk is produced is relatively short, a segment of the yolk will show narrow transverse pale bands on a darker background. We have here another example of a daily rhythm of pigment deposition resulting in the production of an "accidental" barred pattern.

The normal method of melanin deposition appears to produce this barred protopattern in the plumage. If there was selective pressure for the production of a patterned plumage a barred pattern produced by pigment variation would already be present. This pattern is more apparent in some individuals than in others, possibly due to slight physiological differences. If these physiological differences are genetic in origin then there is already the basis for a genetically fixed, barred pattern. Both Whitman (*op. cit.*) and Riddle (*op. cit.*) were of the opinion that plumage patterns in birds were derived from fundamental barring. Recent studies of plumage pattern (Harrison, 1963, and in progress) show that more complex patterns on feathers appear to be derived from simple barred patterning of the fundamental type, and this would seem to lend support to the idea that this fundamental barring based on a daily rhythm of fluctuation in melanin deposition may be the basis of plumage pattern in birds. The abnormal patterns described earlier are the result of the production of similar bars due to a reduction of blood-pressure or an impoverishment of the food supply, which produces a temporary exaggerated imitation of this normal process.

#### ACKNOWLEDGEMENT

I am very grateful to Dr. J. M. Harrison for the loan of specimens showing mottled plumage.

#### References:

- Bolam, G. 1912. Birds of Northumberland and the Eastern Borders.  
Glegg, W. E. 1944. An enquiry into the scope and significance of certain latent or subordinate markings on the feathers of birds on the British List. *Ibis* 86: 511-516.  
Hancock, J. 1874. A catalogue of the Birds of Northumberland and Durham. *Nat. Hist. Trans. of Northumberland and Durham*. 6: 37-38. Pl. 3.  
Harrison, C. J. O. 1963. The incidence and origin of spotted patterns in the Estrildidae. *Ibis*. 105. (In press.)  
Harrison, J. M. 1948. Exhibition of a variety of the Rook. *Bull. B.O.C.* 69: 117-8.  
Harrison, J. M. 1950. Remarks on the "mottled" variety of the Rook, *Corvus frugilegus* *Bull. B.O.C.* 70: 7.  
Harrison, J. M. 1957a. The "white wing-barring" and other variants in the Carrion Crow and Rook. *Bull. B.O.C.* 77: 84-85.  
Harrison, J. M. 1957b. Significant pattern variations in European Corvidae. *Bull. B.O.C.* 77: 131-133.

- Lowe, W. P. 1941. Barred tails in British Birds. *Ibis* 83: 617.  
 Lowe, W. P. 1942. Barred tails in birds. *Ibis* 84: 437-439.  
 Mayaud, N. 1950. On the "mottled" variety of the Rook. *Bull. B.O.C.* 70: 18-19.  
 Riddle, O. 1908. The genesis of fault-bars in feathers and the cause of alternation of light and dark fundamental bars. *Biol. Bull. Marine Biol. Lab. Woods Hole.* 14: 328-370.  
 Rollins, N. White plumage in Blackbirds. *Bull. B.O.C.* 79: 92-96.  
 Sage, B. L. 1956a. On the occurrence of "mottled" plumage in the Carrion Crow. *Bull. B.O.C.* 76: 13-14.  
 Sage, B. L. 1956b. A summary of the known geographical distribution of mutant "mottled" Rooks. *Bull. B.O.C.* 76: 25-28.  
 Sage, B. L. 1956c. Notes on an aberrant Carrion Crow, *Corvus corone corone*, Linnaeus obtained in Hertfordshire. *Bull. B.O.C.* 76: 64-65.  
 Sage, B. L. 1957a. Further notes on the geographical distribution of the "mottled" plumage mutation of the Rook *Corvus frugilegus frugilegus* Linnaeus. *Bull. B.O.C.* 77: 42-43.  
 Sage, B. L. 1957b. On the occurrence of "mottled" plumage in the Jackdaw *Corvus monedula spermologus* Vieillot. *Bull. B.O.C.* 77: 55.  
 Sage, B. L. 1958. Supplementary notes on the geographical distribution of the "mottled" variety of the Rook. *Bull. B.O.C.* 78: 74-75.  
 Whitman, C. O. 1907. The origin of species. *Bull. Wis. Nat. Hist. Soc.* January 1907.  
 Yarrell, W. 1843. History of British Birds.

## A substitute name for the Luzon race of *Copsychus saularis*

by KENNETH C. PARKES

Received 7th January, 1963

Defying all laws of probability, certain things in this world seem to be particularly unlucky for certain people. It appears that I should in the future avoid at all costs the introduction of a new scientific name bearing the prefix *hetero-*. Recently in this journal (*Bull. Brit. Orn. Cl.*, Vol. 81, p. 33) I had to propose the new name *Orthotomus atrogularis rabori* to replace my *O. a. heterolaemus*, a name whose prior use I had completely overlooked. History now repeats itself, and I find that the name *Copsychus saularis heterogynus*, which I recently proposed for the Luzon subspecies of the Dyal, is also preoccupied, as the genus *Kittacincla* is no longer considered separable from *Copsychus*. I therefore offer a substitute name, as follows:

*Copsychus saularis deuteronymus*, nom. nov. Replaces *Copsychus saularis heterogynus* Parkes, *Postilla*, no. 67, 1962, p. 3, not *Kittacincla malabarica heterogyna* Oberholser, *Bull. U.S. Nat. Mus.*, Vol. 98, 1917, p. 53, now *Copsychus malabaricus heterogynus* (Oberholser).

Oberholser's use of this name was called to my attention by the recent paper by Hoogerwerf (*Ardea*, Vol. 50, 1962, p. 183), in which doubt is cast on the taxonomic validity of this and several other Oberholser races of *Copsychus malabaricus*.

## Notes on birds seen in eastern Aden Protectorate

by I. R. GRIMWOOD

Received 27th October, 1962

The following notes elaborate on the information given in Col. R. Meinertzhagen's *Birds of Arabia*, 1954, whose nomenclature is followed throughout.

I am indebted to Mr. John Williams, of the Coryndon Museum, Nairobi, for the identification of the specimens noted as having been collected.